ANALYSIS OF SEX-RATIO BY LENGTH-CLASS FOR BLUEFIN TUNA (*Thunnus thynnus* L.) CAUGHT FROM THE LYBIAN TRAP FISHERY

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SUMMARY

This article analyzes patterns of bluefin tuna sex-ratio by length-class for the Libyan trap fishery in the Mediterranean Sea.

RESUMÉ

(Analyse du sexe ratio par classe de taille du thon rouge (Thunnus thynnus) capture pour le pêcherie de madrague des Libya). Le présent document analyse les schémas du sex-ratio du thon rouge par classe de tailles pour la pêcherie libyenne de madrague dans la Méditerraneé.

RESUMEN

(Análisis del sex-ratio por clase de talla del atún rojo (Thunnus thynnus L.) capturado por las almadrabas de Libia.). Este documento analiza patrones de ratio de sexos del atún rojo por clases de talla para la pesquería libia de almadraba en el Mediterráneo.

KEYWORDS

Bluefin tuna, sex ratio, trap fishing.

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1 Introduction

Several studies regarding bluefin tuna in the Mediterranean Sea and Atlantic have focussed on sex-ratio patterns for catches from different fisheries: Arena (1979), De la Serna y Alot (2003), De la Serna *et al*. (2003), Fenech *et al*. (2003), Hattour (2003), Rey *et al*. (1987) and Rodríguez Roda (1964). The aforementioned studies find differences in the mortality ratios by sex as well as differences in growth rates by sex. These differences result in different percentages of males and females by length-class. Furthermore, as regards bluefin tuna, theses percentages are higher for females belonging to smaller length-classes and lower for females belonging to higher length-classes.

The study of biological parameters of bluefin tuna is progressing in Libya within the framework of the Project 'Research on fishing biology of bluefin tuna (*Thunnus thynnus* L.) and swordfish (*Xiphias gladius* L.) in the Mediterranean Sea' , funded by FAO-COPEMED program and Marine Biology Research Centre of Libya.

Four traps operate in the Libyan coast in recent years: Gazira, Zreg, Zeletin and Garabulli from east to west respectively. These traps usually catch adult bluefin tuna in its spawning migration from west to east Mediterranean Sea (COPEMED, 2000).

The aim of this paper is to give information on sex-ratio patterns of bluefin tuna caught in Libyan traps.

2 Material and methods

A total of 1041 bluefin tuna were sampled from fish caught in Lybian traps between 1999 to 2002. Total length of fish were measured to the lowest cm and sex was recorded. Tuna were sampled randomly and the sex was determined 'de visu'.

3 Results and discussion

Sex ratio by length class (FL-interval: 10 cm) is shown in **Table 1** and **Figure 1**. **Figure 1** includes approximate 95% confidence levels based on a binomial approximation (Collet, 1991). A preliminary analysis of sex-ratio shows that patterns for the Libyan trap fishery are similar to other trap fisheries in the Mediterranean. In general, the proportion of females is higher than the proportion of males for several length classes. Above 230 cm the proportion of males is higher. This general pattern is thought to relate to differences in growth rates and maturation rates among sexes: at present, it is accepted that bluefin tuna females become mature before males.

It can be observed that the transition from higher female percentages to higher male percentages is more drastic for Spanish trap fishery (De la Serna *et al*, 2003) than in Libyan trap fishery. That should be expected for an homogeneous (Atlantic) and heterogeneous (Atlantic and Mediterranean) origin of fish respectively. The preliminary results agree that differences in the sexual maturation depend on the Mediterranean or Atlantic origin of the bluefin tuna (Tawil *et al*, 2001).

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Table 1. Sex-ratio by length-class for bluefin tuna from Libyan trap fishery in the Mediterranean Sea.

	Sex ratio (proportion of females)		
Length - class	**Prop. Fem.**	**ll95%**	**up95%**
100	0,75	0,19	0,99
110	0,58	0,43	0,71
120	0,65	0,55	0,74
130	0,65	0,57	0,73
140	0,57	0,50	0,65
150	0,56	0,49	0,64
160	0,54	0,46	0,63
170	0,51	0,38	0,64
180	0,51	0,38	0,63
190	0,54	0,34	0,72
200	0,53	0,28	0,77
210	0,62	0,32	0,86
220	0,75	0,43	0,95
230	0,73	0,39	0,94
240	0,17	0,00	0,64
250	0,40	0,05	0,85
260	0,00		0,98

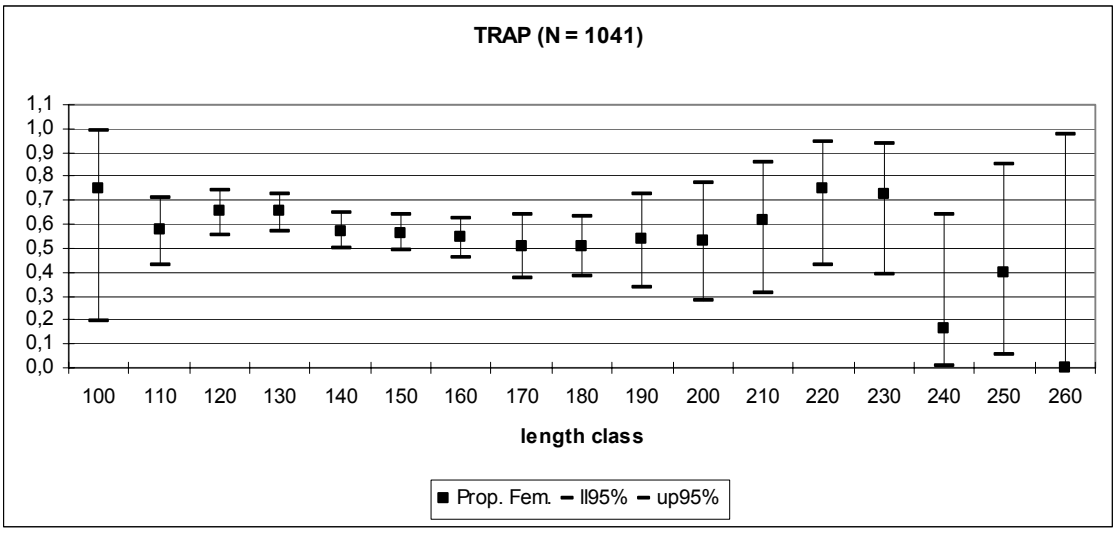

Figure 1. Sex-ratio by length-class (cm) and approximate 95% confidence limits for bluefin tuna from Libyan trap fishery in the Mediterranean Sea.